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Residential building deterioration in Mushin urban slum, Lagos

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ABSTRACT

This study examined residential building deterioration in Mushin urban slum in Lagos Metropolis. Case study research design approach was adopted, while data were sourced qualitatively and quantitatively. All the housing stock in the slum area were identified through satellite imageries and groundtruthing. The total number of buildings enumerated was (6,308) and 0.04% (252) of the buildings were selected as the sample size. Questionnaire were administered on household heads to elicit information on their socio-economic characteristics, housing conditions and characteristics, other information was captured through an observational checklist and in-depth interviews with six estate agents in the neighborhood. The study revealed five factors which includes human, structural, moisture, faulty construction and faulty design accounted for building deterioration in the study area. Therefore, the study recommends the review of building adoptive bye laws in correcting poor housing in urban areas.

Keywords: Residential Building deterioration, residential building indicators, maintenance culture, urban slums, Lagos metropolis.

1. INTRODUCTION

The environmental impacts of urban slums have come to fore in recent decades. Its effects have been exacerbated by climate change thus negatively affecting city resilience and sustainability. Neglect of the urban poor, rapid rate of urbanization, high unemployment, and infrastructural deficit in many cities of developing countries accounted for the proliferation of urban slums. More worrisome, is the inability of policy makers and developers to offer holistic measures in revitalizing these areas. According to Agbola (1997), the failure of planning to correct the issue of urban bug is largely due to the wrong perception of planners by the generality of the populace.

Building functionalities in poorly built housing deteriorates faster than in well-built structures (Islam, et al. 2020). Similarly, poor building maintenance in these areas also complicates efforts to maintain a minimum satisfactory level of service to ensure well-being (Jim, et al., 2016). Consequently, huge capital is required for post-occupancy stage maintenance of structures (Whang, et al., 2017; Chua, et al., 2018; Chew, et al., 2019). Furthermore, most of these structures are built by non-skilled professionals who often uses sub-standard building material, thus structures built are often sub-standard.

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Expectedly, residential building deterioration in urban centers has negative impact on the neighborhood and urban development. For instance, it affects property values within the neighborhood (Rothernburg, 1967). Secondly, it reduces building efficiency and reduces housing options both qualitatively and quantitatively. Further, it affects housing and rental values, thus, limiting the gains of landlords and developers. In addition, building deterioration have negative impact on sustainable city development. Despite its impact of residential deterioration on city development, yet, there have been not been an acceptable framework to address its proliferation. Several approaches have been proposed. For instance, Aigwi et al. (2019) proposed old structure remodeling framework for New Zealand. However, this framework has been critique because of its focus on unoccupied old structures. On the other hand, Cevik et al' (2008) proposed a creative renovation and revitalization model for old structures in Trabzon city, Turkey. Yet, their framework only account for historical buildings.

Several studies such as Adejimi, 2005; Jinadu, 2008; Kunyu, et al. 2007; Kaplinsk, 2013 Chua, et al., 2018; Aigwi, et al., 2019; Islam, et al., 2020; Taherkhani, et al., 2021) have identified five main factors responsible for residential deterioration. They are human factor, structural factor, moisture, faulty construction and faulty design. In addition, Zavadskas (2005) study identified high maintenance cost, building design defects, poor maintenance of facilities, change in material structure, aging of materials, material defects and damages influencing housing deterioration. In a similar vein, socio-economic status of residents, local housing and rental markets, type of tenure systems and socio-cultural factors could influence building maintenance. Hence, this study examines factors that influence residential deterioration in an urban slum area in Lagos Metropolis.

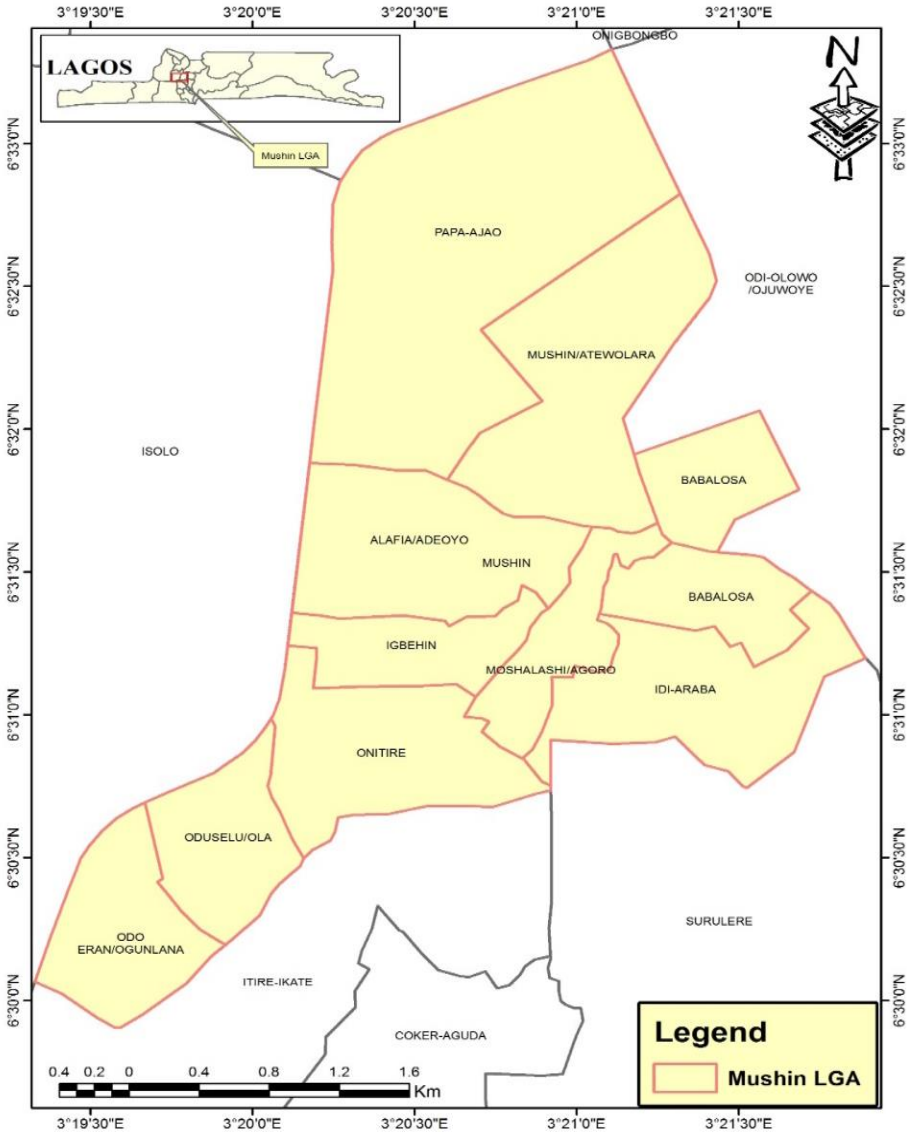

Fig 1: Map Showing Mushin Area in the context of Lagos state

Source: Authors' Analysis, 2021.

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2. MATERIAL AND METHODS

2.1. Research locale

Mushin area is one of the identified slum areas in Lagos metropolis. The history of the town dated back to six hundred years ago. Its geographical coordinates lie within Latitude 6^0 30^0 and 6^0 31^I 18^{II} North and Longitude 3^0 19^I and 3^0 21^I 18^{II} East. The town is bounded in the North by Oshodi-Isolo Local Government, in the East by Shomolu Local Government and in the South by Surulere Local Government. Its inhabitants are predominantly Yoruba. At present, this slum area consists of three main residential slum areas, which are; Mushin, Ilupeju, and Itire. The area has a total population of 633,009, with ten wards (National Population Commission, 2006). It has been noted for low-quality housing and a congested residential area.

2.2. Methods

The study being an exploratory study adopted a case study research design. The study area was chosen because of the peculiarity to this study. First, it reflects poor environmental and neighborhood quality, a large stock of derelict buildings, with manifest indicators of deterioration and poor city planning. The study area though an urban slum, yet serves as gateway to the high-income areas in the metropolis. The total residential stock (6,308) of houses in the enumerated through satellite imageries and groundtruthing through field inspection. 0.04 % (252) of the total housing stock was used as the sample size. The choice of small sampling ratio was largely due to financial constraints and time needed to sample more buildings. However, the sampled structures were a representative fraction of the whole as they were selected randomly selected across all the wards in the study area.

The questionnaire was structured based on information derived from housing deterioration literature and was vetted by housing experts in the department of urban and regional planning, University of Ibadan. Housing checklist was used in assessing housing conditions based on established indicators from the literature. Of the 252 households sampled, 250 respondents effectively responded to the survey and were used for the analysis. Data collected were analyzed using descriptive and inferential statistics.

3. RESULTS AND DISCUSSION

3.1. Housing Characteristics of sampled Residential Buildings

Housing characteristics in the area was surveyed. The study revealed that a majority (76.0%) of sampled structures were within 31-60 years and shows were not in good condition. Thus, many of these buildings were deteriorating so fast because of the age of the building and lack of maintenance of these structures. This affirms the assertion by Jinadu (2008) building age, natural hazards, climate are factors influencing residential building decay. Housing type of respondents were observed. The study shows that a majority (64.0%) of respondents lived in Brazilian structure, 32.0% of respondents stay in a flat, 4% of respondents lived in duplex respectively. As observed during field observations and check-list survey, most of these structures were old, with outdated designs, which were once predominant in the early 1950s and 1960s. The prevalence of rooming apartments depicts a higher household, thus a high density area and continuous demand for rooming apartment. Invariably, the increase in the number of household will cause wear and tear on the structure, lead to overcrowding and probably induce spread of communicable diseases. Furthermore, the study revealed that about two-thirds (61.6%) of structures sampled were not structurally sound, one-fifth (20.0%) were structurally sound, about one-fifth (14.3%) were sound but with evidence of cracks, 3.6% were completely dilapidated, yet still occupied by residents. Most of the structures sampled shows evidence of cracks in the walls and were deplorable condition.

Table 1: Housing Characteristics of sampled Residential Buildings

Housing Variable	Respondent	Percent
Age of building		
10-20	8	3.2
21-30	24	9.6
31-40	60	24.0
41-50	68	27.2
51-60	62	24.8
61-above	28	11.2
N	250	100
Type of house		

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Brazilian	160	64.0
Flat	80	32.0
Duplex	10	4.0
N	250	100
Condition of building		
Structurally sound	50	20.0
Not structurally sound	154	61.6
Cracked	37	14.8
Dilapidated	9	3.6
N	250	100

Source: Authors' Analysis, 2021.

3.2. Indicators of Residential Building Deterioration

The study used five indicators in assessing the rate of deterioration in the study area. The study revealed about two-thirds (68.4%) of the sampled structures had cracked in the walls, while 31.6% of the buildings have not experience crack walls, while about one-third (31.6%) sampled structures do not have cracks. The result implies that more of the buildings have cracks, which indicates poor maintenance and can influence deterioration. Similarly, 47.4% of the housing stocks surveyed had cracked floor while more than a half (52.8%) of the structures do not have cracks on the floors. On the condition of the roofs of sampled structures a majority (71.2%) of the sampled housing stocks have their roofs leaking, while about one-third (28.8%) of these buildings do not have leaking roofs. In terms of housing units that require painting, majority (74.4%) of the buildings require painting or repainting while about one-third (25.2%) of the housing units do not need to be painted or repainted. In a similar vein, about two-fifths (39.6%) of the buildings need general repair, while about two-thirds (60.4%) of the buildings do not require general repairs. The results evidence that the structures were poorly maintained and thus will exacerbate rate of deterioration of these structure. However, from field observations some of these structures were undergoing structural changes in terms of partitioning of existing rooms to create more rooms and spaces for shops to let. According to estate agents in the area, the demand for housing in this area is chiefly for rooming apartments. Hence, many landlords often modify their structures to cater for more rooming apartments. This modification often leads to stress on these old structures and further exacerbate housing deterioration. It could be one reason for the continuous building collapse in this area and other parts of Lagos and more importantly responsible for deterioration of structures.

Table 2: Indicators of Residential Building Deterioration in Mushin

Indicators	**No of building**	**Percent**
Wall cracks		
Crack in the wall	171	68.4
No crack in the wall	79	31.6
N	250	100.0
Cracks floor		
Cracks on the floor	118	47.4
No cracks on the floor	132	52.8
N	250	100.0
Roof leaking		
The roof leaks	178	71.2

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The roof does not leak	72	28.8
N	250	100.0
Housing require painting		
House requires painting	186	74.4
Does not require painting	63	25.2
N	250	100.0
Need general repair		
Houses need general repair	99	39.6
Does not need general repair	151	60.4
N	250	100

Source: Authors' Analysis, 2021.

3.3. Factors Influencing Residential Building Deterioration

The study assessed factors influencing residential building deterioration in Mushin local Government Area. In terms of human factor, more than a half (59.6%) of the respondents reported that owners failure to carry routine checks and proper maintenance influenced building deterioration in the area, about one-third (26.8%) of the respondents ascribed building deterioration in the area to the culture of owners to wait until the condition becomes an emergency, before carrying out repairs while 10.8% and 2.8% of the respondents respectively agreed that building deterioration could be due to ignorance of the causes of decay, poor planning and maintenance. This finding indicates that majority of these buildings suffer deterioration chiefly because of inadequate routine maintenance. This result validates the proposition of Kunya, et al., (2007) which assert that lack of maintenance culture is the dominant factor influencing building deterioration. They affirmed that Nigerians prefer new construction to maintaining existing ones. This evidence was also supported by Adejimi (2005) who affirmed that poor maintenance is responsible for building decay and it is often influenced by incompetency by building managers.

For structural factor; it was observed that natural aging of structural elements accounted for majority (86.8%) of the structural deterioration while lack of maintenance of facilities accounted for 12% of the deterioration. With respect to moisture; more than a half (52.8%) of the respondents indicated that leakages through cracks on the wall are responsible for deterioration of building, about one-third (30.4%) of respondents reported that faulty plumbing unskilled labor, 13.6% of the respondents ascribed deterioration to ground floor constructions giving to dampness that create suitable condition for fungi growth and attack while 3.2% were due to excessive moisture in the internal atmosphere that may lead to excessive condensation and corrosion.

In terms of faulty construction; more than a half (58.8%) of faulty construction faults, was caused by failure to replace defective work, about one-fifth (16.4%) of this faulty construction were due to lack of supervision during the construction period, failure to understand building plans at construction accounted for 12.8% faulty construction, 6.8% were due to negating quality of material for quantity, 2.8% faults at construction was attributed with failure to appreciate the full consequences of shady and use of poor construction materials, while 2.4% cases of faulty construction was attributed to failure of the contractor/builder at the construction phase. Most of these structures are often contracted to quacks, such as bricklayers, draughtsman with little involvement of building and planning professionals such as architects, urban planners and structural engineers.

In the aspect of poor detailing at the design stage; 45.6% of the structures had faulty ceiling finishing, that is flaking-dampness-chemical-incompatibility of the paint with that of the ceiling, 30.4% were due to plaster cracks, 22.4% of structures had plumbing leaks at joints due to use of different metals expansion, while 1.6% of structures had wall bottom due to floor deflection. This results indicates use faulty design at the planning stage might be attributed to use of unskilled professionals, these factors at the designing stage will also exacerbate the burden of building deterioration. Also, human factor in terms of poor maintenance culture of the residents and structural issues such as natural aging of building, inadequate inspection and supervision as well as climate and

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natural hazards. This support the assertion of Adejimi (2005) that "a poorly developed building design eventually results in severe maintenance problem". The predominant of these design faulty conditions across the study areas is a reflection of the socio-economic status and poor maintenance culture of land owners, renters and residents in this area.

Table 3: Factors influencing Housing Deterioration

Factor influencing housing deterioration	Distribution	Structures	Percent
Human factor			
	No routine maintenance	149	59.6
	Ignorance of causes	27	10.8
	Poor planning	7	2.8
	Negative attitude	67	26.8
Structural factor			
	Inadequate inspection	30	59.6
	Natural aging of building	217	86.8
	Reaction to moisture	1	0.4
	Reaction to corrosion	2	0.8
Moisture			
	Faulty plumbing	76	30.4
	Dampness	34	13.6
	Leaks via cracks	132	52.8
	Excessive condensation	8	3.2
Faulty construction			
	Lack of supervision	41	16.4
	Failure to follow specification	32	12.8
	Failure to replace defective work	147	58.8
	Need for quantity than quality	17	6.8
	Using shady materials	7	2.8
	Failure of building managers	6	2.4
Faulty design			
	Plumbing leaks at joints	56	22.4
	Ceiling finishing	114	45.6
	Plaster crack	76	30.4
	Floor detection	4	1.6
	N	250	100

Source: Authors' Analysis, 2021.

3.4. Testing of Hypothesis

H_0: There is no significant relationship between age of building and rate of building deterioration.

H1: There is significant relationship between age of building and rate of building deterioration.

Rate of deterioration of building was measured using five indicators of housing deterioration. These indicators were correlated against age of building. Pearson Product Moment Correlation (PPMC) was used for this test at 95% confidence interval. The result was presented in Table 7. The study revealed positive correlation between age of building and indicators of housing deterioration. Age of building and cracks had a correlation coefficient of 0.53, which indicates a positive relationship between age of building and cracks in the wall. It implies that older buildings develop cracks in the wall, and this can only be mitigated or exacerbate through maintenance culture. The relationship between age of building and cracks on the floors revealed a correlation coefficient of 0.36 which indicates a weak positive relationship between ages of building and cracks on the floor. For relationship between age of building and roof leakages reveals a correlation coefficient of 0.25 which indicates a very weak positive relationship between age of building and roof leakages. The correlation coefficient between age of building and if the house needs painting was 0.12, which

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indicates a very weak positive relationship. Lastly, the correlation co-efficient relationship between age of building and if house require general repair is 0.29 which indicates a very weak but positive relationship between age of building and if the housing unit requires general repair. It is observed that all the five indicators were directly related to age of building and were significant at $p \leq 0.05$ This suggest that as building aged, these five variables also increases, thus, we conclude that rate of building deterioration in this area are manifest through wall cracks, cracks in the floor, roof leakages, house requiring painting, house requiring general repairs.

Plate 1: Roof leak and floor crack

Plate 2: Wall crack

Table 4: Correlation of indicators of housing deterioration and age of building

SN	Correlated variables	N	R_n	p-values	Remarks
1.	Wall crack	250	.528	.000	Sig.
2.	Floor crack	250	.357	.000	Sig.
3.	Roof leakages	250	.252	.000	Sig.

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4.	House require painting	250	.124	.000	Sig.
5.	House require general repair	250	.295	.000	Sig.

Correlation significant at p=0.05; Sig: significant; r_n= Correlation coefficient

4. RECOMMENDATIONS AND CONCLUSION

The study examined residential building deterioration in an urban slum in Lagos metropolis. The study revealed that the prevalent of human factor, structural factor, moisture, faulty construction and faulty design at construction all accounted for residential building deterioration in the study area. These factors were exacerbated by climatic parameters, natural aging of structure and prevalence of poor maintenance culture of occupants and landlords in the areas. Hence, making the area become an eyesore in the city of Lagos. Therefore, study therefore recommends the following suggestions:

Government can put up an agency to manage, upgrade slums and formalized squatter settlements. This agency should also help to make loan available for landowners in slum areas to upgrade their structures to meet minimum planning requirements for decent housing and these loans can be paid back through accrued rents from tenants or other mortgage plans.

City funding arrangement should be organized through partnership of the various levels of government and other all meaning stakeholders to provide infrastructure and effective environmental management in blighted areas.

The state government should have an intensive program to help identify blighted areas in the state, identify the environmental challenges in these areas and address them before consciously integrating these areas with main urban centers.

The development control unit at the state and local level should strengthen their development control and monitoring activities. Every building must meet minimum approval requirements before being approved, illegal structures must be identified at construction stage and demolished. No building must be allowed to exist without an approved building plan and site inspection by officers of the development control unit at the local government planning unit to see that the building was constructed based on approved plans and it is fit for resident' occupation and modification of these structures also requires approval by the physical development planning unit.

The state government need to revisit and review the Building Adoptive Bye laws and specify exactly methods and material of construction, dimensionality of ancillary housing facilities within that is feasible for low and medium income earners.

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Conflicting interests

The authors declare that there are no conflicts of interests.

Data and materials availability

All data associated with this study are present in the paper.

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